# ASSESSMENT OF HERBICIDAL POTENTIALS OF THREE BOTANICALS LEAVE EXTRACT ON WEED ASSOCIATED WITH MAIZE FIELD IN OYO STATE, NIGERIA.

Nkechinyere Clara Isienyi[1,2], Ayodele Rotimi Ipeaiyeda[2], Joy Oluchi Nwogwugwu[1]
[1] Forestry Research Institute of Nigeria, Ibadan, Nigeria.
[2] University of Ibadan, Ibadan, Nigeria, Ibadan, Nigeria

## INTRODUCTION

Maize, a major staple food crop widely grown in Nigeria, is the third most important cereal crop globally after wheat and rice (Ismaila *et al.*, 2010). Maize serves as a raw material for various industries as well as animal food production. It is a crop with seeds that farmers are capable of handling and using to raise a new crop for a long time (Msuya and Stefano, 2010). However, maize production is widely affected by weed interference that prime yield loss. Synthetic herbicides are used to manage weeds but may be detrimental to the environment. Botanicals such as *Eucalyptus torreliana*, *Eucalyptus camaldulensis* and *Leucaena leucocephala* have herbicidal properties and are eco-friendly. However, their efficacy in managing weeds on maize fields have not been adequately documented. Therefore, assessment of herbicidal potentials of Botanicals leave extract in maize field were investigated in Oyo State, Nigeria.

## MATERIALS AND METHODS

These experiments were conducted in the department of Crop Protection and Environmental Biology (CPEB), University of Ibadan (Latitude 7° 27' 01" N and 3° 53' 43"E). All experiment was laid out in Complete Randomised Design (CRD) in triplicate.

### SOIL SAMPLE AND TEST CROP COLLECTION

Top soil was collected into 10kg pot. Physico-chemical analysis were perfumed using standard procedures. Maize (DMTA) seeds were collected from International Institute of Tropical Agriculture (IITA).

### LEAF SAMPLE COLLECTION

Fresh leaves of *Eucalyptus camaldulensis* (Ec), *Eucalyptus torelliana* (Et) and *Leucaenia leucocephala* (Ll) were collected at Forestry Research Institute of Nigeria premises (FRIN) and identified in FRIN Herbarium with 111807, 111806 and 111808, respectively for authentication. FRIN is located in tropical forest between Latitudes 7° 23' 20" to 7 °23' 40" North and longitude 3° 51' 23" to 3° 51' 52" East. The leaves were air dried for six weeks under room temperature, after which the leaves were milled to powder form.

### Leaf Extracts Preparation and Photochemical Analysis

According to the methods described by Fayinminnu and Shiro (2014). Milled Leaf samples (144, 108, 72, 36 and 0 g) of each of botanicals were separately soaked in one litre of distilled water for 48 hours and filtered using a muslin cloth. The different aqueous concentrations ( 100%, 75%, 50%, 25% and 0%) w/v of Ec, Et and Ll obtained as filtrate were stored in the refrigerator at 20°C prior to use. Phytochemical analysis of botanicals used were carried out using standard procedures.

### SEED GERMINATION TEST

Experiment was laid on a CRD in the Laboratory. 48 petri plates containing 10 maize seeds each. 2.0 mL of the aqueous extract concentrations (100 %, 75 %, 50 % and 25 %) of Ec, Et and Ll extract and 0% (distilled water) were added into the petri dishes. These were observed daily for seven days and the experiment was carried out in 2 trials. Data were collected are; number of germinated seeds and plumule lenght. Percentage germinations were calculated using the expression below

$$\text{Percentage Germination} = \frac{\textit{No of germinated Seeds}}{\textit{Total No of seeds planted}} X\ 100$$

### ASSESSMENT OF THE EXTRACTS ON MAIZE GROWTH, YIELD AND WEED FLORA

Top soil of 10 kg was filled into 60 pots for the test crops. Each were treated separately with distilled water, paraquat (5 mL/ha) as control and varying concentrations (100%, 70%, 50%, and 25% w/v) aliquot extract of Botanicals that were prepared.

**Experimental design**

- CRD on (4 by 5 by 1) factorial with three replicates

**Sowing of test crops**

- Before planting, 200 mL plant extracts were applied
- Two seeds of the test crop were sown at 2 cm depth
- Application of the plant extracts were repeated at 5 Week After Sowing (WAS). Data were collected at 3, 5, 7, 9 and 11 WAS

***Growth parameters***

- Plant height (cm) – Metre rule
- Stem diameter (mm) – Vernier calliper
- Number of leaves – Visual counting
- Leave area ($cm^3$) – Tape rule

***Yield parameters***

- Grain yield (g)

***Floristic data***

- Identification of weeds was done at two weeks interval using a weed manual byAkobundu *et al.,* 2016
- Relative importance value (RIV) = ***(Relative frequency + Relative Density)/2***

Data collected were analysed using ANOVA and means separated by new Duncan multiple range test at $\alpha_{0.05}$.

## RESULTS AND DISCUSSION

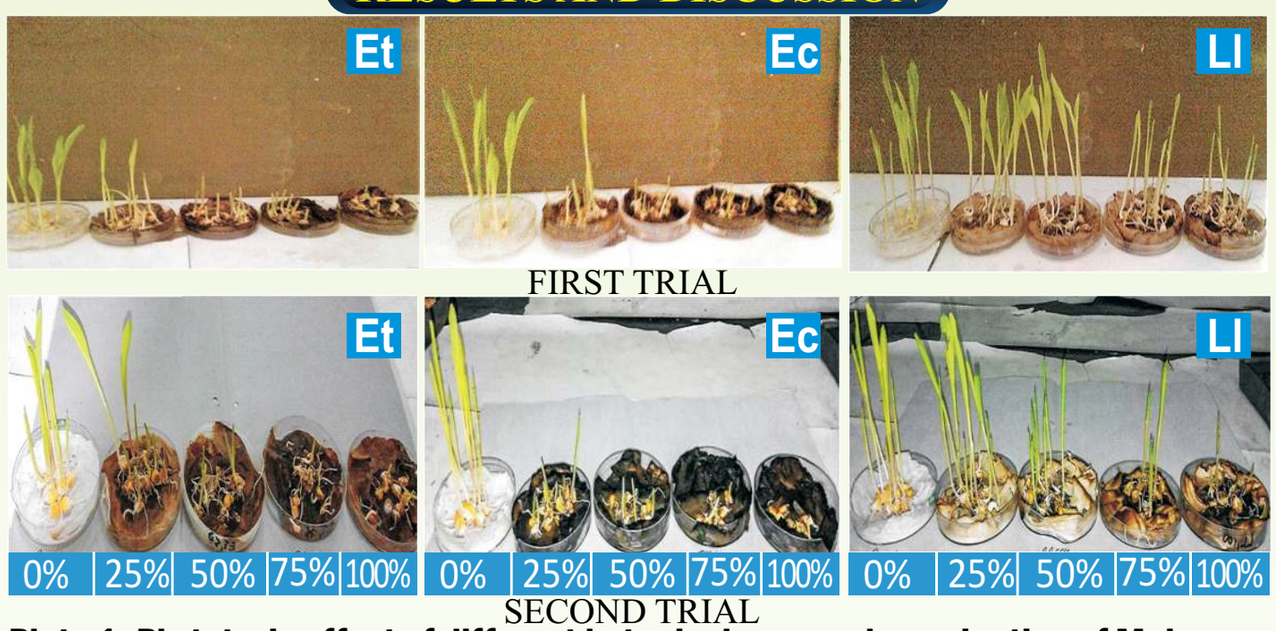


**Plate 1: Phytotoxic effect of different botanicals on seed germination of Maize**

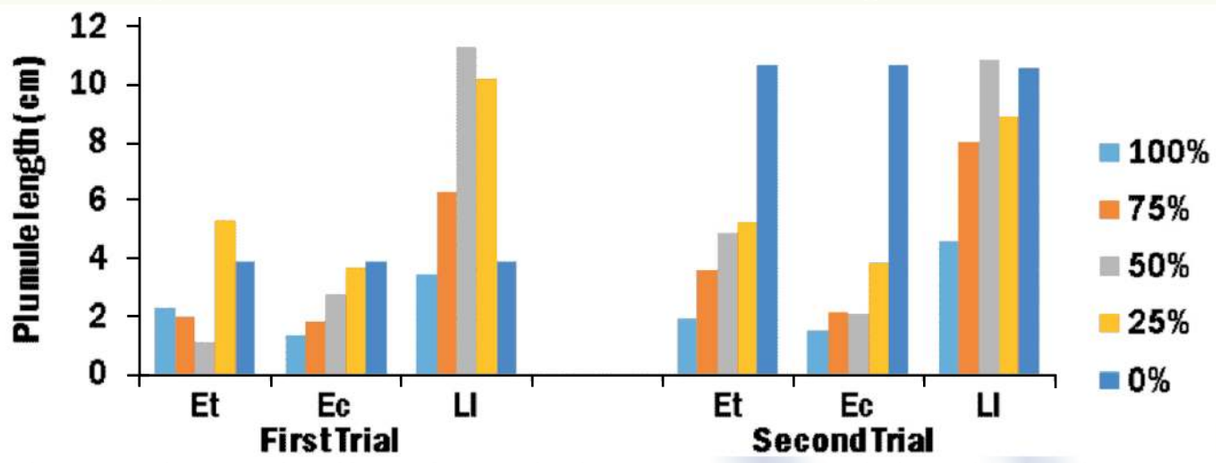


Figure1: Phytotoxic effect of Botanical extracts on Plumule length of maize
Et - E. *torelliana,* Ec - E. *camudulensis,* Ll - L. *leucocephala* , 0% – distilled water,

**Table 1: Species composition and relative importance value of weeds at 3 Weeeks after Sowing maize**

| Trt | Species | Family | CM | 100% | 75% | 50% | 25% | 0% |
|---|---|---|---|---|---|---|---|---|
| Ec | *Alternanthera brasilliana* (L.) Kuntze | Amaranthaceae | - | 4.48 | - | 2.91 | 9.28 | - |
| | *Amaranthus spinosus* Linn. | Amaranthaceae | - | - | 5.95 | - | - | - |
| | *Digitaria horizontalis* wild | Poaceae | - | 4.48 | 9.52 | 8.73 | 3.41 | 9.62 |
| | *Larpotea austeans* (Linn.) chew | Urticaceae | - | - | - | 6.19 | - | - |
| | *Mariscus alternifolius* Vahl | Cyperaceae | 5.21 | 37.99 | 44.05 | 40.28 | 48.70 | 46.23 |
| | *Mitracarpus vilosus* (Sw) DC. | Rubiaceae | 2.01 | 17.14 | - | - | - | 33.16 |
| | *Oldenlandia corymbosa* Linn. | Rubiaceae | - | - | 4.76 | 5.85 | 13.15 | 17.04 |
| | *Peperomia pellucida* (L.) Kunth | Piperaceae | - | - | 2.98 | - | - | 5.18 |
| | *Phyllantus amarus* Schumach. & Thonn. | Phyllanthaceae | - | 10.78 | 13.7 | 13.11 | 3.09 | 10.21 |
| | *Shrankia leptocarpa* DC. | Fabaceae | - | 8.96 | 8.33 | 5.45 | 3.73 | 15.00 |
| | *Talinum fruticosum* (L) | Talinaceae | 3.22 | 16.17 | 10.7 | 17.49 | 15.23 | 19.53 |
| Et | *Ageratum conyzoides* Linn. | Asteraceae | - | - | - | - | - | 7.82 |
| | *Alternanthera brasilliana* (L.) Kuntze | Amaranthaceae | - | 3.40 | 3.10 | 3.40 | 5.22 | - |
| | *Amaranthus spinosus* Linn. | Amaranthaceae | - | 2.72 | - | - | - | - |
| | *Digitarial horizontalis* wild | Poaceae | - | 5.78 | 5.48 | 3.40 | 8.17 | 9.62 |
| | *Mariscus alternifolius* Vahl | Cyperaceae | 5.21 | 45.92 | 46.80 | 48.04 | 44.13 | 46.23 |
| | *Mitracarpus vilosus* (Sw) DC. | Rubiaceae | 2.01 | - | - | - | - | 33.16 |
| | *Oldenlandia corymbosa* Linn. | Rubiaceae | - | - | 5.98 | 6.65 | 11.30 | 17.04 |
| | *Peperomia pellucida* (L.) Kunth | Piperaceae | - | 2.72 | 2.74 | - | - | 5.18 |

Trt-Treatment, Ec - *Eucalyptus camaldulensis*, Et - *Eucalyptus torreliana*, CM- Paraquat, 0% – distilled water

**Table 2: Species composition and relative importance value of weeds at 9 Weeks After Sowing maize**

| Trt | Species | Family | CM | 100% | 75% | 50% | 25% | 0% |
|---|---|---|---|---|---|---|---|---|
| Ec | *Ageratum conyzoides* Linn. | Asteraceae | - | 13.23 | 4.17 | 19.19 | 5.57 | 17.59 |
| | *Amaranthus spinosus* Linn. | Amaranthaceae | - | 3.32 | 5.35 | 3.30 | - | - |
| | *Aspilia africana* (Pers.) C.D. Adams | Asteraceae | - | - | 6.84 | 3.30 | 6.73 | 3.24 |
| | *Cyperus esculentus* Linn. | Cyperaceae | 3.80 | 29.59 | 17.52 | 4.63 | 15.98 | 13.72 |
| | *Mariscus alternifolius* Vahl | Cyperaceae | 9.40 | 27.96 | 20.20 | 35.16 | 18.92 | 38.31 |
| | *Mimosa pudica* Linn. | Fabaceae | - | - | - | - | - | 7.38 |
| | *Oldenlandia corymbosa* Linn. | Rubiaceae | 2.07 | - | 17.22 | 12.60 | 3.38 | 53.83 |
| | *Phyllantus amarus* Schumach. & Thonn. | Phyllanthaceae | - | 13.77 | 12.02 | 3.97 | 4.10 | 6.85 |
| | *Shrankia leptocarpa* DC. | Fabaceae | 6.24 | 3.32 | 6.35 | 3.97 | 10.84 | 17.86 |
| | *Talinum fruticosum* (L) Juss | Talinaceae | - | 8.81 | 10.02 | 13.90 | 7.47 | 14.84 |

Trt-Treatment, Ec - *Eucalyptus camaldulensis*, CM- Paraquat, 0% – distilled water

The findings of this study as shown in Tables 1 and 2 revealed the efficacy of *Eucalyptus camudulensis, Eucalyptus torreliana* and *Leucaena leucocephala* as bio-herbicide on investigated weeds associated with maize in Oyo State. This is in line with Saxena *et al.* (2016) that reported about the presence of phytochemical in some plants that have inhibitory ability.

## CONCLUSIONS

The results of this present study showed that plant extracts have the potential to manage weed in eco-friendly ways, which can be attributed to the presence of some secondary metabolites found in them. The extracts of Ec and Et had higher phytochemical and performed better than that of the Ll in weed management. Similarly, Allelopathic effects of *Eucalyptus* species can be considered as a natural way for sustainable weed management. This research encourages afforestation of forest trees for enhancement of sustainable environment.

## RECOMMENDATION

Eco-friendly weed management is recommended. The negative impact caused by the over use of synthetic herbicides on the Agro Eco-System calls for friendly alternative such as Bio-herbicides for enhancement of environmental sustainability and food security. Therefore, there is need for more research on the development of alternative strategies to reduce over dependence on synthetic herbicides.

## ACKNOWLEDGMENT

I Nkechinyere Isienyi, gratefully appreciate the generous support by IUFRO-SPDC.

## REFERENCE

Fayinminnu, O. O., and Shiro, O. O. 2014. The pesticidal Potential of *Alternanthera brasiliana* (L.) O. Kuntze in solving pest problem in organic agriculture. Proceedings of the 4th ISOFAR Scientific Conference. 'Building Organic Bridges', at the Organic World Congress held at Istanbul, Turkey, 13- 15 October, 2014. Pp. 875- 878.